

Canadian International Merchandise Trade **Seasonal Adjustment**

Both export and import statistics show large monthly fluctuations. In order to isolate turning points or trends in the basic data, it is necessary to eliminate this effect of seasonal movement.

SEASONAL ADJUSTMENT

When, in a time series, the pattern of peaks and troughs during a year is repetitive from year to year, the series is deemed to fluctuate seasonally. These fluctuations are due to various economic, natural and institutional factors such as changes in the weather, statutory holidays and other events which occur at regular intervals and may have a significant albeit foreseeable impact on the rate of economic activity. The seasonal adjustment process removes these fluctuations from the time series.

Statistics Canada uses the X-11-ARIMA (Dagum, 1975 and 1979) method to remove seasonal fluctuations from time series. This method consists in extending a raw time series at both ends using an ARIMA.

Since 1984, two different approaches to the seasonal adjustment method, direct and indirect, are used to adjust international trade time series. Prior to this, the seasonal adjustment was done exclusively using the direct approach. The following paragraphs explain the difference between the two approaches.

Direct Seasonal Adjustment

The direct approach consists in using a set of adjustment factors provided by the X-11-ARIMA method to adjust raw international trade time series at the major group level, when seasonality is detected.

Presently, the series for the current year are passed through X11-ARIMA programs every month and readjusted every time new information is added to it. This is called the concurrent seasonal adjustment.

The concurrent method was introduced in ITD around 1990. Previously, a set of twelve projected factors provided by the X-11-ARIMA adjustment method were used to adjust twelve subsequent periods. The factors were revised only once a year.

Readjustment of time series for the previous year and often, for some years back, takes place during the months of April and May when revisions to the BOP adjustments are applied. These revisions are applied to the appropriate time series along with Customs based revisions. Afterwards, 252 time series are tested for seasonality using the X-11-ARIMA method.

Time series with no detectable seasonal movements are flagged and remain unchanged.

Indirect Seasonal Adjustment

The indirect seasonal adjustment approach for the value time series involves the summation or subtraction of seasonally adjusted time series by the direct method. For the Laspeyres volume indexes and constant dollars series at the Major Group level, the indirect approach consists of dividing seasonally adjusted time series.

Since 1984, the indirect approach has been widely used to adjust sub-total and total international trade time series. However, the indirect approach is not without its drawbacks. For instance, the time series for total exports and imports generated by the summation of Major Groups in one case and by the summation of Principal Trading Areas in the other are not identical. Therefore, the totals generated by the summation of Major Groups are retained as such and represent the benchmarks to adjust the totals generated by the summation of the Principal Trading Areas. The differences are distributed among the seasonally adjusted Principal Trading Areas, according to their share in total imports or exports.

If the time series for the total of imports (or exports) were adjusted directly, the result would be unique. However, the summation of the seasonally adjusted Major Groups or the summation of the seasonally adjusted Principal Trading Areas could differ from the seasonally adjusted total. In order to preserve additivity, the differences would have to be distributed among the components.